AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions and listings of claims in the application, as follows:

Listing of Claims

1 (currently amended) An image compression and expansion apparatus, comprising:

a reduced image generating processor that generates, based on original image data arranged in a first matrix comprised of a plurality of pixels, reduced image data arranged in a second matrix comprised of a smaller number of pixels than said first matrix;

a reduced image recording processor that records said reduced image data in a recording medium;

an orthogonal transforming processor that reads said reduced image data from said recording medium and applies an orthogonal transformation to obtain orthogonal transformation coefficients arranged in said second matrix; and

an expanded image generating processor that applies an inverse orthogonal transformation to all of said orthogonal transformation coefficients to obtain expanded image data arranged in a third matrix ~~comprised of~~ having a greater number of pixels than said second matrix.

2 (currently amended). An image compression and expansion apparatus, comprising:

a reduced image generating processor that generates, based on original image data arranged in a first matrix comprised of a plurality of pixels, reduced image data arranged in a second matrix comprised of a smaller number of pixels than said first matrix;

a reduced orthogonal transformation coefficient data recording processor that records reduced orthogonal transformation coefficient data, obtained by orthogonal transformation of said reduced image data, in a recording medium; and

an expanded image generating processor that reads said reduced orthogonal transformation coefficient data from said recording medium and applies an inverse orthogonal transformation to all of said orthogonal transformation coefficients to obtain expanded image data arranged in a third matrix comprised of a greater number of pixels than said second matrix.

3 (currently amended). The image compression and expansion apparatus according to claim [[1]] 2, wherein said reduced image generating processor obtains an average value of a predetermined number of pixel values included in said first matrix, and sets said average value as one pixel value corresponding to a predetermined number of pixels included in said second matrix.

4 (original). The image compression and expansion apparatus according to claim 3, wherein said average value is obtained from 8 x 8 pixel values included in said first matrix.

5 (previously amended). The image compression and expansion apparatus according to claim 1, wherein said second and third matrixes are comprised of n1 x m1 and n2 x m2 pixels, respectively, and n2 and m2 are 2^N times n1 and 2^M times m1, respectively (where n1, m1, n2, m2, N and M are positive integers).

6 (previously amended). The image compression and expansion apparatus according to claim 1, wherein said first matrix is comprised of 64 x 64 pixels and said second matrix is comprised of 8 x 8 pixels.

7 (previously amended). The image compression and expansion apparatus according to claim 1, wherein the numbers of pixels contained in said first and third matrixes are the same.

8 (previously amended). The image compression and expansion apparatus according to claim 1, wherein said first and third matrixes are each comprised of 64 x 64 pixels.

9 (currently amended). The image compression and expansion apparatus according to claim 1, wherein said orthogonal transformation [[is]] comprises a two dimensional discrete cosine transformation and said inverse orthogonal transformation [[is]] comprises a two dimensional inverse discrete cosine transformation.

10 (currently amended). An [[The]] image compression and expansion apparatus ~~according to claim 9~~ , comprising:

a reduced image generating processor that generates, based on original image data arranged in a first matrix comprised of a plurality of pixels, reduced image data arranged in a second matrix comprised of a smaller number of pixels than said first matrix;

a reduced image recording processor that records said reduced image data in a recording medium;

an orthogonal transforming processor that reads said reduced image data from said recording medium and applies a two dimensional discrete cosine transformation to obtain orthogonal transformation coefficients arranged in said second matrix; and

an expanded image generating processor that applies a two dimensional inverse discrete cosine transformation to said orthogonal transformation coefficients to obtain expanded image data arranged in a third matrix comprised of a greater number of pixels than said second matrix, wherein said first, second, and third matrixes are comprised of 64 x 64,

8 x 8, and 64 x 64 pixels, respectively, and said expanded image generating processor obtains expanded image data by [[a]] said two dimensional inverse discrete cosine transformation expressed by the following formula:

$$I'^{(s,t)}_{yx} = \frac{1}{4}\sum_{u=0}^{7}\sum_{v=0}^{7} CuCvD^{(s,t)}_{vu} \cdot \cos\frac{(2x+1)u\Pi}{128}\cos\frac{(2y+1)v\Pi}{128}$$

wherein, $0 \le x \le 63$, $0 \le y \le 63$, I'_{yx} is the pixel value of expanded image data, Cu, $Cv = 1/2^{1/2}$ when u, v=0, Cu, Cv=1 when u, v≠0, and D_{vu} is a DCT coefficient obtained by said two dimensional discrete cosine transformation.

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11 (currently amended). A pixel number increasing apparatus, comprising:

an orthogonal transforming processor that applies an orthogonal transformation to image data arranged in a first matrix comprised of a plurality of pixels to obtain orthogonal transformation coefficients of image data arranged in said first matrix; and

an expanded image generating processor that applies an inverse orthogonal transformation to all of said orthogonal transformation coefficients to obtain expanded image data arranged in a second matrix ~~comprised of~~ having a greater number of pixels than said first matrix.

12 (currently amended). The pixel number increasing apparatus according to claim 11, wherein said orthogonal transformation [[is]] comprises a two dimensional discrete cosine transformation and said inverse orthogonal transformation [[is]] comprises a two dimensional inverse discrete cosine transformation.

13 (currently amended). A [[The]] pixel number increasing apparatus ~~according to claim 11~~ , comprising:

an orthogonal transforming processor that applies a two dimensional discrete cosine transformation to image data arranged in a first matrix comprised of a plurality of pixels to obtain orthogonal transformation coefficients of image data arranged in said first matrix; and

an expanded image generating processor that applies a two dimensional inverse discrete cosine transformation to said orthogonal transformation coefficients to obtain expanded image data arranged in a second matrix comprised of a greater number of pixels than said first matrix, wherein said first and second matrixes are comprised of 8 x 8 and 64 x 64 pixels, respectively, and said expanded image generating processor obtains expanded

image data by said two dimensional inverse discrete cosine transformation expressed by the following formula:

$$I_{yx}^{'(s,t)} = \frac{1}{4} \sum_{u=0}^{7} \sum_{v=0}^{7} CuCvD_{vu}^{(s,t)} \cdot \cos\frac{(2x+1)u\Pi}{128} \cos\frac{(2y+1)v\Pi}{128}$$

wherein, $0 \leq x \leq 63$, $0 \leq y \leq 63$, I'_{yx} is the pixel value of expanded image data, Cu, $Cv=1/2^{1/2}$ when u, v=0, Cu, Cv=1 when u, $v \neq 0$, and D_{vu} is a DCT coefficient obtained by said two dimensional discrete cosine transformation.

14 (currently amended). A pixel number increasing apparatus, comprising an expanded image generating processor that applies an inverse orthogonal transformation to all image data arranged in a first matrix comprised of a plurality of orthogonal transformation coefficients to obtain expanded image data arranged in a second matrix ~~comprised of~~ having a greater number of pixels than said first matrix.

15 (currently amended). The pixel number increasing apparatus according to claim 14, wherein said orthogonal transformation [[is a]] coefficients comprise two dimensional discrete cosine transformation coefficients and said inverse orthogonal transformation [[is]] comprises a two dimensional inverse discrete cosine transformation.

16 (currently amended). A [[The]] pixel number increasing apparatus ~~according to claim 15~~ , comprising an expanded image generating processor that applies a two dimensional inverse discrete cosine transformation to image data arranged in a first matrix comprised of a plurality of two dimensional discrete cosine transformation coefficients to obtain expanded image data arranged in a second matrix comprised of a greater number of pixels than said first matrix, wherein said first and second matrixes are comprised of 8 x 8 and 64 x 64 pixels, respectively, and said expanded image generating processor obtains expanded image data by said two dimensional inverse discrete cosine transformation expressed by the following formula:

$$I_{yx}^{'(s,t)}=\frac{1}{4}\sum_{u=0}^{7}\sum_{u=0}^{7} CuCvD_{vu}^{(s,t)}\cdot\cos\frac{(2x+1)uII}{128}\cos\frac{(2y+1)vII}{128}$$

wherein, $0 \leq x \leq 63$, $0 \leq y \leq 63$, I'_{yx} is the pixel value of expanded image data, Cu, $Cv=1/2^{1/2}$ when u, v=0, Cu, Cv=1 when u, $v \neq 0$, and D_{vu} is a DCT coefficient obtained by ~~said~~ a two dimensional discrete cosine transformation.